

What is claimed is:

1. A system to deliver radiation to a substrate, comprising:

a radiation source to generate radiation having a source intensity distribution pattern; and

5 a redistribution radiation guide adapted to receive the radiation from the radiation source and to direct the radiation from one region to different regions on the substrate so that the substrate intensity distribution pattern is different from the source pattern.

10 2. The system of claim 1, wherein the redistribution radiation guide directs the radiation from one region to different regions by spreading out the source section.

15 3. The system of claim 1, wherein the radiation guide comprises a plurality of spreading components for spreading a region of the radiation source to a larger region on the substrate.

20 4. The system of claim 3, wherein the spreading component of the radiation guide distributes a local concentration section of the radiation source over a large region on the substrate for a more uniform distribution of radiation source on the substrate.

5. The system of claim 1, wherein the redistribution radiation guide directs the radiation from one region to different regions by shifting the source section when the radiation guide is moving.

5 6. The system of claim 1, wherein the radiation guide comprises a plurality of shifting components for shifting a region of the radiation source to a different region on the substrate.

10 7. The system of claim 6, wherein the shifting component of the radiation guide spreads a local concentration section of the radiation source over a large region on the substrate for a more uniform distribution of radiation source on the substrate when the radiation guide is moving.

15 8. The system of claim 6, wherein the shifting components of the radiation guide shift a ring section of the radiation source to a ring section on the substrate, and shift a portion of the ring section of the radiation source progressively to a portion of a ring section on the substrate so that a ring portion of the source is directed to many different ring portions of the substrate when the radiation guide is moving.

20 9. The system of claim 8, wherein the ring section on the substrate is wider than the ring section of the radiation source to spread the radiation source over a large region.

10. The system of claim 1, wherein the radiation source comprises one or more lamps.

5 11. The system of claim 1, wherein the radiation is thermal radiation for heating the substrate.

12. The system of claim 1, wherein the radiation is visible light radiation for lighting the substrate.

10 13. The system of claim 1, further comprising a substrate temperature sensor coupled to the substrate.

14. The system of claim 13, wherein the substrate temperature sensor is a pyrometer or a thermocouple in contact with the substrate.

15 15. The system of claim 1, further comprising a motor coupled to the radiation guide to move the radiation guide.

20 16. The system of claim 15, further comprising a processor coupled to a substrate temperature sensor and to the motor.

17. The system of claim 15, wherein the motor rotates the radiation guide.

18. The system of claim 15, wherein the motor rocks the thermal radiation guide in an oscillatory manner.

19. The system of claim 15, wherein the motor rocks the thermal radiation guide in more than one dimensions.

20. The system of claim 1, wherein the radiation source is positioned substantially parallel to the substrate and the radiation guide is positioned in a direct path between the radiation source and the substrate.

21. The system of claim 21, wherein the radiation guide comprises a light pipe.

22. The system of claim 1, wherein the radiation source is positioned at a first angle to the substrate and the radiation guide is positioned at a second angle to the substrate to direct radiation from the radiation source to the substrate.

23. The system of claim 22, wherein the radiation source is positioned at a 90 degree angle to the substrate and the radiation guide is positioned at a 45 degree angle to the substrate.

24. The system of claim 22, wherein the radiation guide comprises a surface to reflect radiation from the radiation source to the substrate.

25. A method for heating a semiconductor substrate, comprising:

generating thermal radiation using a radiation source; and

sending the thermal radiation through an uniformity radiation guide to the substrate.

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26. The method of claim 25, further comprising:

moving the radiation guide to sweep the thermal radiation over the substrate to achieve a uniform substrate temperature.

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27. The method of claim 25, further comprising measuring the substrate temperature in a closed-loop feedback control.

28. The method of claim 27, further comprising measuring substrate temperature using a pyrometer or a thermocouple.

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29. The method of claim 25, further comprising rotating the substrate.

30. The method of claim 25, further comprising reflecting the radiation through one or more radiation reflection spots on the radiation guide.

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31. A system to process a substrate, comprising:

a chamber adapted to receive the substrate;

a radiation source coupled to the chamber to generate radiation; and

a uniformity radiation guide adapted to receive the radiation from the radiation source and to direct the radiation to different regions on the substrate with a substrate intensity distribution pattern different from the source pattern.

- 5      32. The system of claim 31, further comprising a motor coupled to the radiation guide to move the radiation guide.